



# Soil and Resource Report for Mangawhai Hills.

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## 1.0 INTRODUCTION

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This report has been prepared at the request of the client to assess the Land Use Capability (LUC) classes at a Moir Street property in Mangawhai. The New Zealand Resource Inventory (NZLRI) maps have classified part of the property as LUC class 3. As such, this area could potentially fall under the National Policy Statement for Highly Productive Land (NPS-HPL).

The purpose of the report is to map in detail the land classified as LUC class 3 by the NZLRI and identify any Highly Productive Land as defined by the National Policy Statement for Highly Productive Land (NPS-HPL). To achieve this, a site visit was carried out to map the soils and land use classes present and assess them in relation to the NPS-HPL.

This report presents the description of each of the soil types identified on the proposed site as well as descriptions of each of the LUC units mapped. This information is then used to determine and quantify any highly productive land present. This information is accompanied by LUC, and soil maps along with the relevant LUC unit and soil profile descriptions.

## 2.0 MAPPING METHOD

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A site visit was carried out on the 13<sup>th</sup> of April 2023 to evaluate and describe the soil types and the LUC units present. The site of interest was mapped at a scale of 1:5,000.

LUC mapping was carried out in accordance with the methods described in the 3rd Edition of the Land Use Capability Survey Handbook (Lynn et al 2009). This process involves making a land resource inventory (LRI) of the property in which soil types, soil parent materials, land slopes, erosion type and severity and land cover are recorded. Whenever any of these land features changes a new unit is made.

Specific field work activities include digging and describing soil profiles on each landform with supporting holes dug or profiles observed on bank/drain cuttings to establish soil boundaries, measuring slopes with a clinometer, and gathering any other data that may be of assistance in assessing the suitability of the land for primary production such as erosion, susceptibility of the land to flooding, winter wetness and/or cold, high temperatures, exposure to salt winds, aspect, and accessibility. This information is then used to determine the specific LUC units, as described in the LUC Classifications of the Northland Region (Harmsworth, 1996) for the area. At times when mapping at a scale finer than Harmsworth (1996) of 1:50,000, new LUC units are recorded and are noted with an \* in the LUC description table.



## 3.0 SITE DESCRIPTION

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The property located at Moir Street and covers approximately 218 hectares. Of the total area approximately 10ha has been mapped as LUC class 3 by the NZLRI. This area of the property consists of mostly flat to rolling topography with a combination of peat and sand, and sedimentary soils. Drainage is poor across the peaty and sand flats and imperfectly to poorly drained on the podzolised sedimentary soils. Part of the area of interest has been developed in preparation for a church building and infrastructure with the remaining area being used for grazing beef cattle.

### 3.1 Soil Profiles and Descriptions

The soils identified at the proposed site are presented and described in the table below. Their distribution is shown on the soil map in Section 6.0 of this report.

Soil Profile	Soil Profile Description
	<p><b>Soil Name:</b> One Tree Point peaty sand (OT)</p> <p><b>Soil classification:</b> Organic soils from the Ruakaka suite.</p> <p><b>Parent material:</b> Peat and sand.</p> <p><b>Soil description:</b>            0-190mm: Friable, weakly to moderately developed, 2-5mm crumb, very dark greyish brown (10yr 3/2) slightly sticky, non-plastic, sandy loam.            190-380mm: Very friable, weakly developed, 2-5mm crumb, pale brown (10yr 6/3), slightly sticky non plastic, peaty sandy loam with bluish black (Gleyed 2 2.5/10B) patches and very dark brown (7.5yr 2.5/2) peat.            420mm: Watertable.</p> <p><b>Overall drainage:</b> Poorly drained</p>
	<p><b>Soil Name:</b> Otonga peaty clay loam (OG)</p> <p><b>Soil classification:</b> Organic soils from the Otonga suite.</p> <p><b>Parent material:</b> Peat and some alluvium.</p> <p><b>Soil description:</b>            0-220mm: Friable, moderately developed, 2-3mm crumb, dark greyish brown (2.5y 4/2), sticky, plastic, peaty sandy clay.            220 -Water table.</p> <p><b>Overall drainage:</b> Poorly drained</p>



**Soil Name:** Mahurangi fine sandy loam. (MV)

**Soil classification:** Weakly to moderately podzolized yellow-brown earths from the Puhoi suite.

**Parent material:** Banded sandstone.

**Soil description:**

0-140mm: Friable, moderately developed, 2-5mm crumb, dark grey (10yr 4/1) sticky, plastic, fine sandy loam.

140-190mm: Friable, moderately to strongly developed, 2-10mm nut, very dark grey (10yr 3/1) with light grey (10yr 7/2) podzolisation, very sticky, plastic, fine sandy clay.

190-700mm: Friable, strongly developed, 2-5mm crumb, light yellowish brown (2.5y 6/3) to light grey (2.5y 7/1) sticky, plastic, fine sandy clay with strong brown (7.5yr 5/8) mottling. Mottling increases with depth and light grey colour becoming predominant.

**Overall drainage:** Moderately to poorly drained

### 3.2 Land Use Capability Descriptions

LUC classifications categorize land into eight classes according to its long-term capability to sustain one or more productive uses.

- Classes 1-4 have arable potential with limitations to this land use moving from class one being the most versatile, multi-use land with minimal physical limitations for arable use and increasing to severe limitations under class four land. These classes are also suitable to viticulture, berry production, pastoralism, tree crops and production forestry.
- Classes 5-7 are suitable for pastoral farming and production forestry.
- Class 8 land has no productive use and is rather managed for catchment protection and conservation purposes.

The LUC units mapped on the proposed site are presented in the table below with copies of the full unit descriptions taken from Harmsworth (1996) contained in Appendix 1. An LUC map showing the distribution of the mapped units is contained in Section 6.

Resource information	Luc unit	Total area (ha)	Parent material	Dominant soil type	Slope (degree)	Land Cover	Erosion degree & severity		Landuse suitability	Stock carrying capacity (su/ha)
							Actual	Potential		Forestry site index (FSI)
<b>3w 4</b> Flat land to undulating land with organic soils on alluvial and estuarine plains, terraces and in interdune areas.		4.04	Peat and fine alluvium	Organic soils on peat or peat and sand	0-7°	Pasture	Nil	Negligible to Slight wind when cultivated	Grazing Horticulture Cereals Root and green fodder crops	Average: 17 Top: 20 Potential: 24  FSI: 19-29
<b>4s 4</b> Flat to undulating slopes within a subdued rolling landscape with podzols and podzolised brown soils.		0.82	Fine alluvium or unconsolidated clays and silts and sheared mixed lithologies.	Podzols and podzolised brown soils.	0-15°	Pasture	Nil	Moderate gully and tunnel gully under pasture. Slight to moderate sheet, rill and gully when cultivated.	Pasture Root and green fodder crops Forestry	Average: 13 Top: 15 Potential: 18  FSI: 26-30

*Land use capability unit descriptions are taken from the author's field work, and the Land Use Capability Classification of the Northland Region (Harmsworth, 1996).*

*Revised stock carry capacities are taken from a review of Harmsworth (1996) stock carry capacities by Bob Cathcart in 2017*

## 4.0 SOIL CLASSIFICATIONS

### 4.1 Highly Productive Land

The NPS-HPL came into effect in October 2022. This policy seeks to protect the productivity potential of our most productive land by regulating non-productive land uses and inappropriate subdivision. The policy statement identifies all land in LUC classes 1, 2 and 3 as highly productive land. The following definition is taken from section 1.3, page 4 of the NPS-HPL:

*LUC 1, 2, or 3 land means land identified as Land Use Capability Class 1, 2, or 3, as mapped by the New Zealand Land Resource Inventory or by any more detailed mapping that uses the Land Use Capability classification.*

### 4.2 Site Classifications

The table below shows the LUC area breakdown for the proposed site as well as the percentage of highly productive land.

**With Tea Tree removed.**

LUC Unit	Area (ha)	HPL Classification	% of total Area
3w 4	4.04	HPL	38.7
4s 4	0.82	Not HPL	7.8
Developed	1.79	Not HPL	17.1
Trees	1.15	Not HPL	11.0
Residential	2.65	Not HPL	25.4
<b>Total area</b>	<b>10.45</b>		
<b>Area HPL</b>	<b>4.04</b>	<b>Total % HPL</b>	<b>38.7</b>
<b>Total area non-HPL</b>	<b>6.41</b>	<b>Total % non-HPL</b>	<b>61.3</b>

#### 4.2.1 Reclassified LUC Units

The area mapped by the NZLRI as 3w 4 has been reclassified based on a detailed farm scale survey of the area with the new classifications shown in the table above and on the LUC map in Section 6.

- 3w 4 to 4s 4 – this area has been reclassified as the soil is Mahurangi fine sandy loam not One Tree Hill peaty sand and the slope is class C - rolling slopes rather than class A – flat.
- 3w 4 to developed – this area has undergone significant earthworks and reshaping including aggregate application in preparation for a new building and associated infrastructure. As such it is no longer a viable productive area. Soil on this area is also not One Tree Point peaty sand but rather a Mahurangi fine sandy loam and Wharekohe silt loam and as such would make this area a LUC 4s 4 unit if no development had been carried out.

- 3w 4 to trees – this area has a dense cover of mature trees and therefore cannot be used for any other productive purpose in its current state. This area also has a significant proportion of Mahurangi and Wharekohe soils and rolling hill slopes. These features would put the respective areas into LUC units 4s 4 and 4e 5.
- 3w 4 to residential. This area is comprised of small residential lots including residential dwellings and associated buildings and as such cannot be used for any productive purposes.

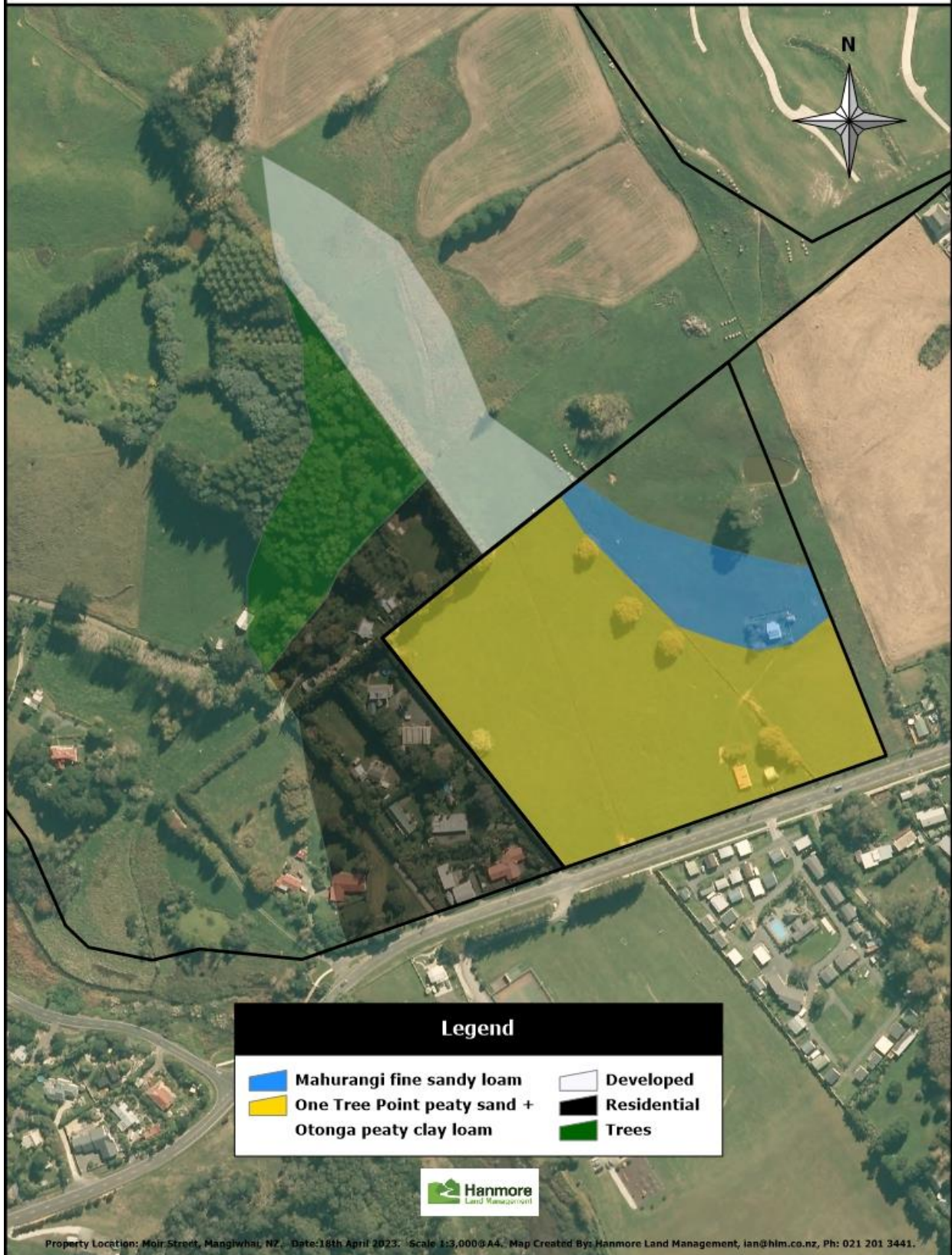
## 5.0 OVERALL SITE ASSESSMENT

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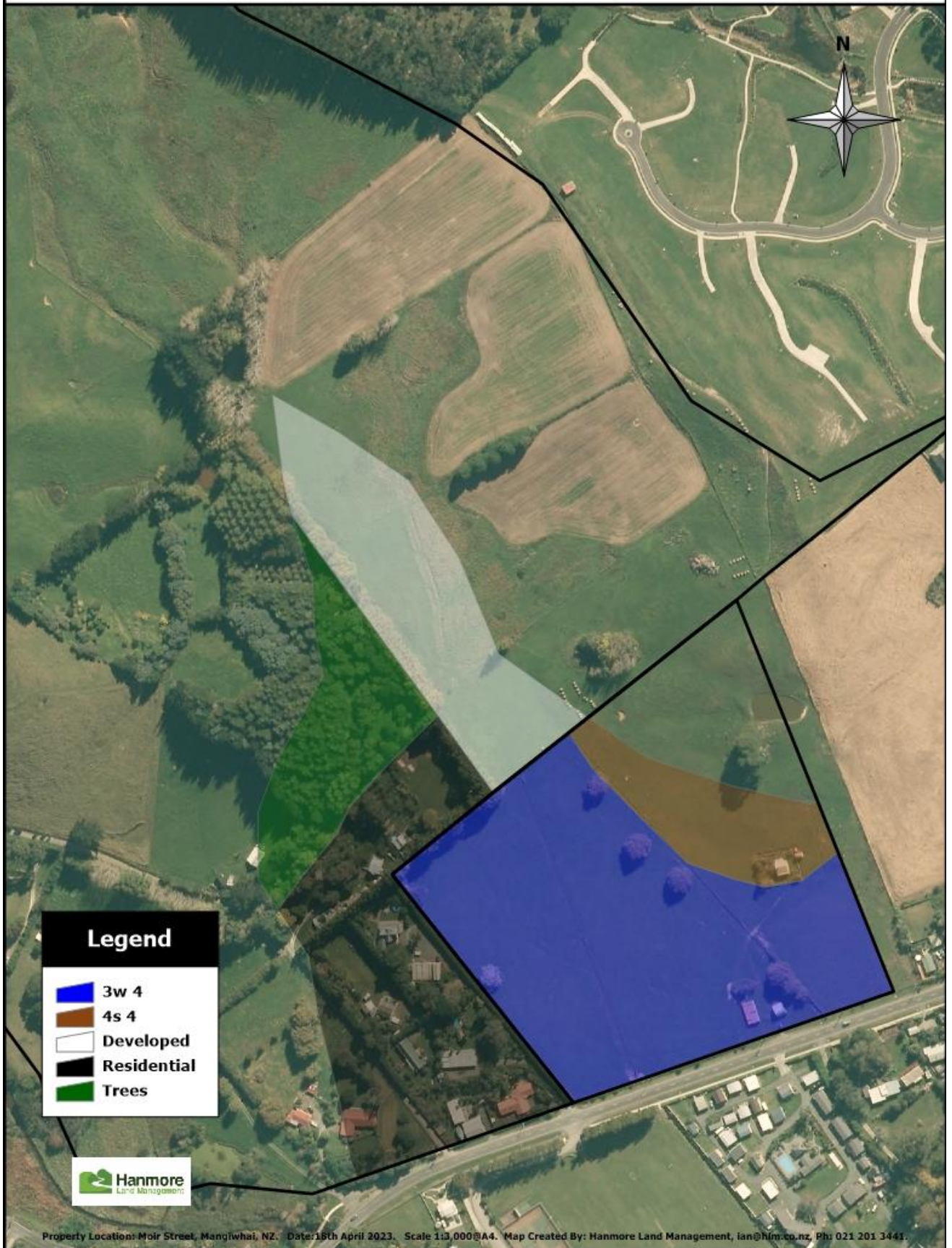
Under the NPS-HPL all LUC units in LUC classes 1, 2 and 3 are classified as HPL. As such, only the area of 3w 4 land will come under this classification. This area covers 4.04ha or 38.7% of the area mapped by the NZLRI as being class 3w 4. The remaining areas consist of LUC class 4 land or unproductive areas and is therefore outside of the HPL classification. The HPL classifications are presented in the soil classifications map in Section 6.



# Mangawhai Hills Soil Map



# Mangawhai Hills Land Use Capability Classifications



# Mangawhai Hills Soil Classifications



## 124 LUC UNIT DESCRIPTIONS

<b>LUC unit:</b>	<b>IIIw4 (13 375 ha)</b>
<b>LUC suite:</b>	2. Alluvial and estuarine plains and low terraces
<b>LUC subsuite</b>	2e. Peats: (LUC units IIIw4, IVw3, VIw3, VIIw2)
<b>Description:</b>	Flat to undulating land with organic soils on alluvial and estuarine plains, terraces, and in interdune areas. Land types include poorly drained valley floors on peat and sand within older sand dune environments and peaty areas on surface of Quaternary-aged terraces. In sand country isolated pockets of podzols on lacustrine sediments, too small to be separately delineated, may be included with soils in this unit. Watertables may be near the surface in winter months. Has moderate wetness limitation for arable use.
<b>Type location:</b>	004/315342 Spains Road, Sweetwater
<b>Altitudinal range:</b>	0–100 m
<b>Slope:</b>	Flat to undulating (A, A+B), 0–7°
<b>Landform:</b>	Peat areas on terraces, alluvial plains, swamps, valley floors, valley plains. Often mapped in depressions between sand dunes.
<b>Rock type:</b>	Peat (Pt) often intercalated with fine alluvium (Af), e.g. Pt/Af, Pt+Pt/Af.
<b>Soils:</b>	Organic soils on peat or peat and sand. Organic soils of Ruakaka suite (OT, PZ, RK, RKu, RKd, RKv, RKl) and Otonga suite (OG, OGd, OGv, OR, ORd).
<b>Erosion:</b>	<i>Present:</i> Negligible (0) <i>Potential:</i> Negligible (0) to slight (1) wind (W) when cultivated
<b>Vegetation:</b>	Improved pasture (gl), rushes, sedges (hR), vegetables, nurseries (cV), subtropical fruit (cS), manuka, kanuka (sM), root and green fodder crops (cR).
<b>Annual rainfall range:</b>	1200–1600 mm
<b>Land use:</b>	<i>Present:</i> Grazing – Intensive – Present average carrying capacity (s.u./ha) = 17 – Top farmer carrying capacity (s.u./ha) = 20 Cropping – Root and green fodder crops. Cereals. <i>Potential:</i> Grazing – Intensive – Attainable physical potential carrying capacity (s.u./ha) = 24 Cropping – Root and green fodder crops. Cereals. Horticulture. Forestry – Production – site index for <i>Pinus radiata</i> = 19–22
<b>Soil conservation management:</b>	– Drainage required in some areas to control/manage watertable levels. Maintain condition of drains. Optimum watertables for specific land uses should be regulated and water allocation planned and monitored. – Suitable flood protection should be carefully planned and management considered over broader catchment area. Stopbanks may be necessary in some areas. – Shelterbelts recommended in some areas particularly under arable land use, e.g. cropping, or horticultural land use, to help regulate watertable levels and for micro-climatic control.
<b>Comments:</b>	Occasional logs/organic debris requires removal for horticulture/cropping particularly in the sand country. Can be effectively drained for high-producing pasture and arable land (e.g. horticulture).

<b>LUC unit:</b>	<b>IVs4 (21 753 ha)</b>
<b>LUC suite:</b>	4. Sedimentary rock terrain excluding greywacke
<b>LUC subsuite:</b>	4g. Podzols on sedimentary rock: (LUC units IVe12, IVs4, IVw4, VIs5)
<b>Description:</b>	Flat to undulating slopes within a subdued rolling landscape where podzols and podzolised yellow-brown earths have developed on alluvium, colluvium and/or a range of sedimentary lithologies including fractured and sheared sedimentary lithologies, and deeply weathered massive sedimentary deposits. Typical gumland. Soils generally of very low natural fertility and have poor structure. Extreme limitations for arable use.
<b>Type location:</b>	R10/560065 Pine Valley Road, Silverdale
<b>Altitudinal range:</b>	0–400 m
<b>Slope:</b>	Flat to rolling (A-C), 0–15°
<b>Landform:</b>	Flat to rolling surfaces within subdued landscape. Includes surfaces within downlands, terraces, and plains.
<b>Rock type:</b>	Fine alluvium (Af) or unconsolidated clays and silts (Uf), sheared mixed lithologies (Mx). A mixture of shattered and sheared sedimentary lithologies (Mx), often associated with alluvium (Af), unconsolidated clays and silts (Uf), or argillite (Ar).
<b>Soils:</b>	Podzols and podzolised yellow-brown earths on various sedimentary rocks. Podzols of Whareora suite (KRa, KR, KRy, KRe), Puhoi suite (WKf, WKfp), Waiotira suite (WKa) Omu suite (WK, WKr), Maungarei suite (PR). Moderately podzolised yellow-brown earths of Puhoi suite (HKf, MV, OU), Waiotira suite (HKa, PD, PW), Omu suite (HK, HKg, YK, YKI, OP), Marua suite (HKr), Maungarei suite (PM), Omanaia suite (HW).
<b>Erosion:</b>	<i>Present:</i> Negligible (0) to slight (1) sheet (Sh) and gully (G) <i>Potential:</i> Moderate (2) gully (G) and tunnel gully (T) under pasture. Slight (1) to moderate (2) sheet (Sh) rill (R) and gully (G) when cultivated
<b>Vegetation:</b>	Improved pasture (gl), rushes, sedges (hR), podocarp forest (fP), lowland podocarp–broadleaved forest (fP), commonly scattered in pasture, manuka, kanuka (sM), gorse (sG).
<b>Annual rainfall range:</b>	1200–1600 mm
<b>Land use:</b>	<i>Present:</i> Grazing – Intensive to semi-intensive, incl. dairying – Present average carrying capacity (s.u./ha) = 13 – Top farmer carrying capacity (s.u./ha) = 15 Undeveloped land <i>Potential:</i> Grazing – Intensive – Attainable physical potential carrying capacity (s.u./ha) = 18 Cropping – Root and green fodder crops Forestry – Production – site index for <i>Pinus radiata</i> = 26–30
<b>Soil conservation management:</b>	Good soil conservation management is essential. – When cultivating, contour cultivation and minimum-tillage practices are essential to minimise sheet and rill erosion. Avoid structural degradation of soils under saturated conditions. Deeper cultivation may be necessary to break up hard layers at depth.

- Surface drains required. Maintain condition of drains.
- Attention to subsurface drainage necessary in some areas.
- Control grazing by avoiding overstocking and concentrated stock movement (e.g. repeated tracking, tracking along fencelines, gates, around troughs). Controls may include closer subdivision, rotational grazing, adequate spelling of pastures. Avoid excessive pugging of soils by heavy stock in winter.
- Pugging of soils is a major problem.
- Control runoff using appropriate techniques such as grassed waterways, graded banks.
- Maintain good-quality pasture cover/apply adequate fertiliser-trace-element levels.

**Comments:**

Soils strongly acid, very strongly leached, have poor structure and are gleyed in low-lying areas. Drainage generally poor and biological activity very low. Soils can maintain good pastures for pastoral farming, with moderate applications of lime and plant nutrients, but light stocking in winter is essential to prevent surface pugging.

## 8.0 REFERENCES

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Harmsworth, G.R. 1996. Land Use Capability classification of the Northland region. A report to accompany the second edition (1:50,000) NZLRI worksheets. Landcare Research Science Series 9. Lincoln, Manaaki Whenua Press.

Lynn IH, Manderson AK, Page MJ, Harmsworth GR, Eyles GO, Douglas GB, Mackay AD, Newsome PJF 2009. NZ Land Use Capability Survey Handbook – a New Zealand handbook for the classification of land 3rd Edition. Hamilton, AgResearch; Lincoln, Landcare Research; Lower Hutt, GNS Science.



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